



19th Panhellenic Conference/Summer School

NONLINEAR SCIENCE AND COMPLEXITY

Thessaloniki, July 10 – 22, 2006

*Main Amphitheater: Polytechnic School
Aristotle University of Thessaloniki*

LECTURE PROGRAM

Sponsored by:

Ministry of Education (Department of Conferences), Ministry of Culture (Department of Conferences), Ministry of Foreign Affairs (Secretariat of Hellenic Diaspora), University of Thessaloniki

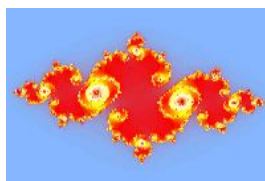
UNIVERSITY OF THESSALONIKI

AND

UNIVERSITY OF PATRAS

CENTER FOR RESEARCH AND APPLICATIONS OF NONLINEAR SYSTEMS

<http://www.math.upatras.gr/~crans>



MONDAY, 10 JULY

3rd Workshop on Nanosciences & Nanotechnologies – NN06 [Physics Department, Room A31, Monday July 10: 9 am – 7.45 pm]

This is a one-day special Scientific Event co-organized by the Summer School and the Workshop. Since nonlinearity and complexity do not only appear at the nanoscale, but also indicate ways for manipulating nanoprocesses and manufacturing nanodevices, it should be useful for the future generation of mathematicians, physicists and engineering scientists to be aware of the richness and beauty of nanoscale phenomena. Thus, all participants of the 19th Summer School on **NONLINEAR SCIENCE & COMPLEXITY** are required to attend the 1st day of the NN06 Workshop. Several of the Workshop lectures of that day will be a good introduction to those lectures of the Summer School which, this year, are especially devoted to nonlinearity and complexity at the nanoscale. The NN06 Workshop is organized under the auspices of the NN Graduate Program, which is an **Interdepartmental Program of the Aristotle University of Thessaloniki (Physics, Chemistry, Biology and General Department of the Polytechnic School)**. Another special Cultural Event is organized for the first day of the second week (Monday, July 17) as described in the Program and a related leaflet. A separate page with the 1st day program of the NN06 Workshop will also be provided to the participants of the Summer School.

TUESDAY, 11 JULY

Morning Session: 09:00 – 13:45

Chairmen: T. Bountis and E.C. Aifantis

- 09:00 – 09:30 **Greetings – Introductory Remarks**
T. Bountis (Patras), E.C. Aifantis(Thessaloniki)
- 09:30 – 10:45 **Chaos in Quantum Mechanics**
G. Contopoulos (Athens)
- 10:45 – 12:00 **The Poincare Map and the Method of Averaging: A Comparative Study**
J. Hadjidemetriou (Thessaloniki)
- 12:00 – 12:30 *Coffee Break*
- 12:30 – 13:45 **The Sitnikov Problem: A Toy Model for Nonlinear Dynamics**
R. Dvorak (Vienna)

Afternoon Session: 17:30 – 21:00

Chairman: J. Hadjidemetriou

- 17:30 – 18:45 **Physics and Complexity**
A. Bazzani (Bologna)
- 18:45 – 20:00 **The Complexity of Granular Matter: Solid, Fluid, and Gas**
J. P. van der Weele (Patras)
- 20:00 – 21:00 **Coffee/Discussion/Posters – Formation of Study Group A:
Organization/Classification of Interdisciplinary Topics and Themes.**
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WEDNESDAY, 12 JULY

Morning Session: 09:30 – 13:45

Chairman: E. Kaxiras

- 09:30 – 10:45 ***Dynamic Phase Transitions, Critical Behavior and Scale Invariance in Non-Equilibrium Systems***
M. Zaiser (Edinburgh)
- 10:45 – 12:00 ***Biological Structures Mitigate Catastrophic Fracture through Various Strategies***
R. Ballarini (Cleveland)
- 12:00 – 12:30 *Coffee Break*
- 12:30 – 13:45 ***Biomedicine at the Nanoscale***
T. Tsakalakos (New Jersey)

Afternoon Session: 17:30 – 21:00

Chairman: E.C. Aifantis

- 17:30 – 18:45 ***Simulations of Complex Materials Across Multiple Scales***
E. Kaxiras (Boston/Ioannina)
- 18:45 – 20:00 ***Complex Physical Materials: Experiments and Simulations***
P. Kelires (Heraclion)
- 20:00 – 21:00 ***Coffee/Discussion/Posters – Formation of Study Group B: Organization/Classification of Interdisciplinary Topics and Themes.***

THURSDAY, 13 JULY

Morning Session: 09:30 – 13:45

Chairman: T. Tsakalakos

- 09:30 – 10:45 ***Nanomechanics: Applications in Nanoengineering and Nanotechnology***
K. Komvopoulos (Berkeley)
- 10:45 – 12:00 ***Nanomechanics: Theory and Experiment***
E.C. Aifantis (Thessaloniki/Houghton)
- 12:00 – 12:30 *Coffee Break*
- 12:30 – 13:45 ***Study of Pre-seismic Signals Using Complexity and Criticality***
K. Eftaxias (Athens)

Afternoon Session: 17:30 – 21:00

Chairman: P. Kelires

- 17:30 – 18:00 ***Elasticity and Dislocations at the Nanoscale***
X. Markenscoff (San Diego)
- 18:00 – 18:30 ***Nonlinear Elasticity and Applications in Civil and Bio Systems***
P. Kakavas (Patras)
- 18:30 – 19:00 ***Nonlinearity and Complexity in Soil Dynamics***
K. Pitilakis (Thessaloniki)
- 19:00 – 19:30 ***On the Selection of Active Fault Planes***
T. Putelat (Thessaloniki/Cambridge)
- 19:30 – 20:00 ***Complexity in Biology: Scale free Systems***
T. Choli-Papadopoulou (Thessaloniki)
- 20:00 – 21:00 ***Coffee/Discussion/Posters – Formation of Study Group C: Meeting of Study Groups***

FRIDAY, 14 JULY

Morning Session: 09:30 – 13:45

Chairman: S. Ichtiaroglou

- 09:30 – 10:45 ***A New Method for Distinguishing Chaos from Order in Hamiltonian Systems***
Ch. Skokos (Paris)
- 10:45 – 12:00 ***Classical Chaotic Scattering***
C. Jung (Cuernavaca)
- 12:00 – 12:30 *Coffee Break*
- 12:30 – 13:45 ***Nonlinearity in Dislocations and Josephson Junctions***
N. Flytzanis (Heraclion)

Afternoon Session: 17:30 – 21:00

Chairman: C. Jung

- 17:30 – 18:00 ***Application of Complexity Science to Urban Systems***
A. Bazzani (Bologna)
- 18:00 – 18:30 ***Self-Assembly and Responsiveness in Polymer Systems***
S. Anastasiadis (Thessaloniki)
- 18:30 – 19:00 ***Meteor Impact and Granular Jet Formation***
J. P. van der Weele (Patras)
- 19:00 – 19:30 ***Dynamics and Structure of Amorphous Materials Using Methods of Molecular Dynamics***
C. Varsamis (Athens)
- 19:30 – 20:00 ***Localized Periodic and Quasiperiodic Solutions in the Discrete NLS with Diffraction Management***
P. Panayotaros (Mexico City)
- 20:00 – 20:30 ***Coffee/Discussion/Posters – Formation of Study Group D: Meeting of Study Groups***
- 21:00 - 23:00 ***Reception at Nomarhia's Garden***

SATURDAY, 15 JULY

Morning Session: 09:30 – 14:00

Chairman: A. Bazzani

- 09:30 – 10:30 ***Passive Targeted Energy Transfer Phenomena Coupled Oscillators with Strong Symmetry-breaking Nonlinearities***
A. Vakakis (Athens)
- 10:30 – 11:30 ***Hierarchical Modelling in Polymers***
T. Theodorou (Athens)
- 11:30 – 12:00 ***Nonlinearity Effects in the Dynamics of a Semiconductor Quantum Well Structure***
E. Paspalakis (Patras)
- 12:00 – 12:30 *Coffee Break*
- 12:30 – 13:00 ***Recurrence Quantification Analysis of Molecular Dynamics Simulations***
A. Fragkou (Volos)
- 13:00 – 13:30 ***A Stochastic Excitable Model for Electricity Prices***
A. De Sanctis (Pescara)
- 13:30 – 14:00 ***Stochastic Processes with Long-range Dependencies***
J. Halley (Thessaloniki)
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SUNDAY, 16 JULY

EXCURSION TO CHALKIDIKI

MONDAY, 17 JULY

Morning Session: 10:00 – 14:00

Chairman: E. Aifantis

- 10:00 – 11:00 ***Modern Democracy, Technology and Referendum***
A. Dimitropoulos (Athens)
- 11:00 – 12:00 ***Complexity in International Diplomacy***
N. Lygeros (Lyon)
- 12:00 – 12:30 *Coffee Break*
- 12:30 – 13:30 ***Complexity and Uncertainty in Modern Societies and the Media***
P. Savvidis/K. Zouraris (Thessaloniki)
- 13:30 – 14:00 ***Discussion: Science/Technology/Society Interactions***
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MONDAY EVENING, 19:00 – 22:00

CULTURAL EVENT

*Macedonian Museum of Modern Art
Helexpo, 154 Egnatia St., Thessaloniki*

- 19:00 – 20:00 ***Part I: Voice, Music***
Savina Yannatou – Solo Voice
Alternative Rock/Electronica
- 20:00 – 20:30 *Break – Museum Visit*
- 20:30 – 22:00 ***Part II: Theater***
The Apology of Socrates (*Translation of Plato by Electra Andreadi*)
Loukas Skipitaris/Broadway Veteran Director
Yannis Simonides/Emmy Award Winning Actor
Theoni Aldredge/Academy (Oscar) Award Winning Costume Designer
Caryn Heilman/Master Percussionist
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TUESDAY, 18 JULY

Morning Session: 09:30 – 14:00

Chairman: L. Vlahos

- 09:30 – 10:45 ***Molecular Motors in Electrostatic Mechanics***
G. Tsironis (Heraclion)
- 10:45 – 12:00 ***The Complexity of Nonlinear Time Series Analysis***
D. Kugiumtzis (Thessaloniki)
- 12:00 – 12:30 *Coffee Break*
- 12:30 – 13:00 ***Nonlinear Analysis and Visualization of the Genome of Evolutionally Newer Organisms***
P. Katsaloulis (Athens)
- 13:00 – 13:45 ***A New Paradigm for Crystallization: Self-organization via Combined Structure and Density Fluctuations in Complex Matter.***
V. Basios (Brussels)

Afternoon Session: 17:30 – 21:00

Chairman: G. Tsironis

- 17:30 – 18:00 ***Complex Phenomena in Signal and Image Analysis***
S. Efstratiadis (Thessaloniki)
- 18:00 – 18:30 ***Scaling Phenomena in Time Series***
S. Loutridis (Larissa)
- 18:30 – 19:00 ***Nonlinear Waves in Continuous and Discrete Systems***
V. Rothos (Thessaloniki/Heraclion)
- 19:00 – 19:30 ***Nonlinearity in Water Waves***
T. Karambas (Mytilini)/S. Koutitas (Thessaloniki)
- 19:30 – 20:00 ***The 26 December 2005 Indian Ocean Megatsunami***
S. Pavlides (Thessaloniki)
- 20:00 – 21:00 ***Coffee/Discussion – Formation of Study Group E***
Meeting of Study Groups

WEDNESDAY, 19 JULY

Morning Session: 09:30 – 14:00

Chairman: K. Hizanidis

- 9:30 – 10:45 ***Hamiltonian Chaos in Classical and Quantum Mechanics***
M. Robnik (Maribor)
- 10:45 – 12:00 ***Stability and Chaos in Multi-Dimensional Hamiltonian Systems***
T. Bountis (Patras)
- 12:00 – 12:30 *Coffee Break*
- 12:30 – 13:15 ***Geometry, Topology and Classical Mechanics***
S. Pnevmatikos (Patras)
- 13:15 – 14:00 ***Orders with Ten Elements are Circle Order***
N. Lygeros (Lyon)

Afternoon Session: 17:30 – 21:00

Chairman: D. Kugiumtzis

- 17:30 – 18:00 ***Exact Analysis of Adiabatic Invariants in a Time-Dependent Harmonic Oscillator***
M. Robnik (Maribor)
- 18:00 – 18:30 ***The Echo Effect in Chaotic Scattering***
B. Jung (Cuernavaca)
- 18:30 – 19:00 *Coffee Break*
- 19:00 – 19:30 ***A Study of Resonances and Chaos in Planetary Motion***
G. Voyatzis (Thessaloniki)
- 19:30 – 21:00 ***Coffee/Discussion/Posters – Meeting of Study Groups***
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THURSDAY, 20 JULY

Morning Session: 09:30 – 14:00

Chairman: T. Bountis

- 09:30 – 10:45 ***Complex Phenomena in Nonlinear Optics and Photonics***
K. Hizanidis (Athens)
- 10:45 – 11:30 ***Regular and Anomalous Diffusion***
L. Vlahos (Thessaloniki)
- 11:30 – 12:00 ***Anomalous Diffusion and the Random Walk Approach***
H. Isliker (Thessaloniki)
- 12:00 – 12:30 *Coffee Break*
- 12:30 – 13:00 ***Estimating the Border of Stability of Symplectic Maps Using Evolutionary Algorithms***
Y. Petalas (Patras)
- 13:00 – 13:45 ***Singular Perturbation Methods in Nonlinear Model Reduction and Control***
P. Daoutidis (Thessaloniki)

Self-organized Afternoon Session: 17:30 – 21:00

Short Presentations & Interventions (Selections from Posters)

FRIDAY, 21 JULY

Morning Session: 09:30 – 14:00

Chairman: G. Voyatzis

- 9:30 – 10:45 ***Creating Regional Business Opportunities in Life Sciences, Information/Bio Technology and Energy/Environment***
K. Kyparissides (Thessaloniki)
- 10:45 – 12:00 ***Thin Films and Nanotechnologies***
S. Logothetidis (Thessaloniki)
- 12:00 – 12:30 *Coffee Break*
- 12:30 – 13:15 ***Symmetry and the Terminal Condition***
P. G. L. Leach (Durban)
- 13:15 – 14:00 ***Elements of Financial Mathematics***
K. Andriopoulos (Patras)

Afternoon Session: 17:30 – 21:00

Chairman: M. Vrabatis

- 17:30 – 18:00 ***Gradient Plasticity and Nanoindentation***
K. Aifantis (NSF/St. Petersburg)
- 18:00 – 18:30 ***Severe Plastic Deformation for Bulk Nanostructured Materials***
A. Wiczorek (Thessaloniki/Vienna)
- 18:30 – 19:00 ***Composite Models for Nonlinear Stress-Strain Curves in Nanomaterials***
R. Hellmig (Thessaloniki/Clausthal)
- 19:00 – 19:30 ***Composite Models for Nonlinear Stress-Strain Curves in Semi-crystalline Polymers***
F. Spieckermann (Thessaloniki/Vienna)
- 19:30 – 20:00 ***Fractals, Wavelets and Size Effects in Deformation and Fracture***
A. Konstantinidis (Thessaloniki)
- 20:00 – 21:00 ***Coffee/Discussion – Formation of Study Group G: Organization/Classification of interdisciplinary topics and themes.***
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SATURDAY, 22 JULY

Chairmen: T. Bountis and E. Aifantis

09:30 – 11:30 *Discussion of the Results/Presentation of the Work of the Study Groups*

11:30 – 12:30 *Preparation of the 20th Summer School at Patras, July 2007*

HAPPY SUMMER TO EVERYONE!
